DEPARTMENT OF THE ARMY
DoD 23.4 Small Business Innovation Research (SBIR) Annual BAA
Proposal Submission Instructions

INTRODUCTION

Where big ideas come to life, the Army SBIR and STTR programs align innovative small businesses with critical U.S. Army priorities to turnover game-changing solutions to our most critical customer – the soldier.

Proposers responding to a topic in this BAA must follow all general instructions provided in the Department of Defense (DoD) SBIR 23.4 Program BAA. The DoD 23.4 SBIR Program BAA can be found here: https://www.defensesbirsttr.mil/SBIR-STTR/Opportunities/. Army requirements in addition to or deviating from the DoD Program BAA are provided in the instructions below.

Specific questions pertaining to the administration of the Army SBIR Program and these proposal preparation instructions should be directed to: Dr. Ann-Kathryn Rockwell at ann.kathryn.rockwell.civ@aal.army.

December 06, 2022: Topic issued for pre-release
January 10, 2023: Army begins accepting proposals via DSIP
January 17, 2023: DSIP Topic Q&A closes to new questions at 12:00 p.m. ET
January 31, 2023: Deadline for receipt of proposals no later than 12:00 p.m. ET

From **December 06, 2022 to January 9, 2023,** this topic is issued for Pre-Release with the names of the topic authors. During the pre-release period, proposing firms have an opportunity to contact topic authors through https://calendly.com/ak-rockwell-aal/dpms to schedule a time to ask technical questions about the topic. Questions should be limited to specific information related to improving the understanding of the topic's requirement. Proposing firms may not ask for advice or guidance on solution approach and you may not submit additional material to the topic author. If information provided during an exchange with the topic author is deemed necessary for proposal preparation, that information will be made available to all parties through the DSIP Topic Q&A module.

Once the Army begins accepting proposals on **January 10, 2023**, no further direct contact between proposers and topic authors is allowed unless the Topic Author is responding to a question submitted during the pre-release period. However, proposers may submit written questions through the DSIP Topic Q&A module at https://www.dodsbirsttr.mil/submissions/login. The DSIP Topic Q&A for this topic opens on **December 06, 2022** and closes to new questions on **January 17, 2023 at 12:00PM ET.** Once the BAA closes to proposal submission, no communication of any kind with the topic author or through Topic Q&A regarding your submitted proposal is allowed.

Deadline for Receipt: Proposals must be **completely** submitted no later than **12:00 p.m.** ET, on **January 31, 2023**. Proposals submitted after 12:00 p.m. ET will not be evaluated. The final proposal submission includes successful completion of all firm level forms, all required volumes, and electronic corporate official certification.

PHASE I PROPOSAL GUIDELINES

The Defense SBIR/STTR Innovation Portal (DSIP) is the official portal for DoD SBIR/STTR proposal submission. Proposers are required to submit proposals via DSIP; proposals submitted by any other

means will be disregarded. Detailed instructions regarding registration and proposal submission via DSIP are provided in the DoD SBIR Program BAA.

Technical Volume (Volume 2)
The technical volume is not to exceed 10 pages and must follow the formatting requirements provided in the DoD SBIR Program BAA. Any pages submitted in excess of the 10 page limit will not be considered in proposal evaluations.

Content of the Technical Volume
Detailed Phase I proposal instructions can be found at: http://aal.army/assets/files/pdf/sbir-phase-1-template.pdf

Cost Volume (Volume 3)
The Phase I Base amount must not exceed $150,000 for a 3 month period of performance. A no-cost two month PoP extension may be possible, based on progress.

Company Commercialization Report (CCR) (Volume 4)
Completion of the CCR as Volume 4 of the proposal submission in DSIP is required. Please refer to the DoD SBIR Program BAA for full details on this requirement. Information contained in the CCR will not be considered during proposal evaluations.

Supporting Documents (Volume 5)
Proposers can submit an optional slide deck of 10 slides in Volume 5: Supporting Documents. The slide deck can contain information on the technical approach, the team, commercialization plans, or relevant technology/research the proposers have developed, and it should contain additional/complementary information to the technical volume. If a proposer elects to submit a slide deck, its information will be used in the evaluation process. A sample Slide Deck template is located here: http://aal.army/assets/files/pdf/sbir-optional-slide-template.pdf.

PHASE II PROPOSAL GUIDELINES
Phase II proposals may only be submitted by Phase I awardees. Phase II proposal submission window, notification process, expected budget/duration structure and additional instructions will be provided in the Phase I contract or by subsequent notification.

DISCRETIONARY TECHNICAL AND BUSINESS ASSISTANCE (TABA)
The Army, at its discretion, may provide Technical and Business Assistance (TABA). The Army will select a preferred vendor(s) for the Army SBIR TABA program through a competitive process. Alternately, a small business concern may, by contract or otherwise, select one or more vendors to assist the firm in meeting the TABA goals. The Applicant must request the authority to select its own TABA provider in its Army SBIR proposal and must demonstrate that the vendor is uniquely postured to provide the specific technical and business services required. TABA funding will be denied if the offeror fails to include the cost and detailed explanation in its proposal.

Participation in the Army SBIR TABA program is voluntary for each Army SBIR awardee. Services provided to Army SBIR firms under the auspices of the TABA program may include, but are not limited to:

1. Access to a network of scientists, engineers, and technologists focused on commercialization and transition considerations such as protected supply chain management, advanced manufacturing, process/product/production scaling, etc;

2. Assistance with intellectual property protections, such as legal considerations, intellectual property rights, patent filing, patent fees, licensing considerations, etc;
3. Commercialization and technology transition support such as market research, market validation, development of regulatory or manufacturing plans, brand development;
4. Regulatory support such as product domain regulatory considerations, regulatory planning, and regulatory strategy development.

The Army SBIR program sponsors participation in the TABA program. The resource limitation for each firm is as follows:

- Phase I Firms:
    - Army-Preferred Vendor: If approved, the contractor may receive up to $6,500 worth of assistance services per project per year (in addition to the base SBIR award amount).
    - Firm-Selected Vendor: If approved, the contractor may receive up to $6,500 in contract obligation (in addition to the base SBIR award amount) per project per year.
- Phase II Firms:
    - Army-Preferred Vendor: If approved, the contractor may receive up to $50,000 worth of assistance services per project per year (in addition to the base SBIR award amount).
    - Firm-Selected Vendor: If approved, the contractor may receive up to $50,000 in contract obligation (in addition to the base SBIR award amount) per project per year.

EVALUATION AND SELECTION

The Army will conduct an evaluation of each responsive, timely, eligible proposal in accordance with the evaluation criteria listed in the DoD Program BAA. It is the policy of the Army to ensure equitable and comprehensive proposal evaluations based on the evaluation criteria and to select the source (or sources) whose offer meets the Government's technical, policy, and programmatic goals.

As previously stated herein, timeliness, responsiveness, and eligibility will be assessed upon initial screening, during evaluation, and after selection. Proposals that do not comply with the instructions and requirements detailed in this document, the DoD Program BAA, or the corresponding Topic posting (including the research objective(s)), will be considered ineligible, nonresponsive, untimely, or non-conforming and therefore will not be evaluated or considered for award.

Using the evaluation criteria, the Government will evaluate each responsive, timely, eligible proposal in its entirety, documenting the strengths and weaknesses relative to each evaluation criterion. Proposals will not be evaluated against each other during the evaluation process, but rather evaluated on their own individual merit to determine how well the proposal meets the criteria stated in this BAA and the corresponding opportunity.

Selected proposals are those determined to be the most advantageous to the Government, consistent with instructions and evaluation criteria specified in the DoD Program BAA, the component-specific instructions herein, the corresponding Topic posting, and availability of funding.

Proposing firms will be notified via email of selection or non-selection status for a Phase I or direct to Phase II award within 90 days of the closing date of the Topic. The notification will be sent to the Corporate Official listed on the proposal cover sheet from the Army SBIR Program Office mailbox. The Army promotes transparency regarding the technical evaluation for all Army SBIR proposals. The Army will provide a technical evaluation narrative to the proposer in accordance with the SBA Policy Directive, Appendix I, paragraph 4. The selection decision notice contains instructions for retrieving the technical evaluation narrative.

Proposers must not regard the notification email (selection decision notice) as an authorization to commit or expend funds. After the Army SBIR Office has recommended a proposal for award, a Government Contracting Officer may contact the proposer in order to discuss and request additional information required for award. This may include representations and certifications, certified or other than certified cost data, subcontracting plan for small businesses, and/or other information as applicable to the proposed award. Proposers must not regard these communications as an authorization to commit or expend funds. Unless a Government Contracting Officer signs the award document (i.e. contract), no obligations to provide funding are made. The Government may reject the proposal or cancel the contract action at any time.

If signed by the Government Contracting Officer, the award document is the official and authorizing instrument (i.e. contract). The anticipated period of performance start date will be determined at time of award. The Contracting Officer will email the signed, authorizing award instrument to the principal investigator (PI) and/or an authorized organization representative.

Refer to the DoD SBIR Program BAA for procedures to protest the Announcement.

As further prescribed in FAR 33.106(b), FAR 52.233-3, Protests after Award should be submitted to:
Email: usarmy.pentagon.hqda-asa-alt.mbx.army-applied-sbir-program@mail.mil
Mailing Address:
Army Applied SBIR Office
2530 Crystal Dr; Ste 11192
Arlington, VA 22202

AWARD AND CONTRACT INFORMATION
Please refer to Section 2.2, Three Phase Program provided in the DoD Program BAA for detailed information regarding SBIR/STTR phase structure and flexibility.

Applied SBIR Phase I Proposal Review v2-0-3 Evaluation Criteria Defined

		DEFINITION
INTRODUCTION	*weight 5%*	Write a clear, concise description of what your innovation does or will do, and where you are in your evolution. Make clear its intended impact on the Army. Evaluators should "get it" after reading this.
POTENTIAL FOR ARMY IMPACT	OPERATIONAL IMPACT	At the scale of a single Army end-user, argue that their jobs or lives will be significantly improved if your solution is adopted. What is the impact of your solution for a soldier/Army civilian vs. today's solutions?
weight 25%	POTENTIAL SCALE OF IMPACT	Here, we're looking for an idea of how broad the impact you described above could be. Look into the future to a time when your solution is both technically mature and actively in use by Army personnel. Describe the scale and scope of your impact within the context of the Army.
TECHNICAL FEASIBILITY	SCIENTIFIC FEASIBILITY	Is the science behind the solution sound? Convince readers who don't have deep expertise in your field that your innovation is built atop sound scientific and engineering principles.
	ENABLING TECHNOLOGIES	Point to the foundational technologies that you rely on to deliver your solution. Do the required enabling technologies introduce added risk? Using proven (and ideally Army-fielded) underlying technologies and techniques helps to lower technical risk.
	ALTERNATIVE TECHNICAL APPROACHES	From a technologist's perspective, why is your proposed solution the best choice for the Army? Refute the alternative engineering approaches others are using. Why does your technology win?
weight 25%	TECHNICAL RISK MITIGATION	No matter your current technology readiness level, technical risks remain. Identify those risks. Present a credible plan to tackle those risks.
TRANSITION	ARMY TRANSITION PATHWAY	Planning for success, what's next for you after this SBIR award? Describe the next type of deal you aim to make with the Army, e.g. a CRADA, a different SBIR contract, a CSO, etc. Briefly outline your current plan to unlock that next opportunity and/or share the biggest risks you see post this SBIR award.
weight 20%	SBIR MILESTONE SCHEDULE	Please share with us a thoughtful execution plan. Strike a balance between giving us a sense of the detailed thinking behind the scenes and the need for your contracting officer to manage a reasonably small number of milestones during your period of performance.
FIRM CASH FLOW	FIRM SURVIVAL RISK	SBIR funds are meant to fuel growth rather than stave off a firm's impending financial failure. Demonstrate that your company will survive financially as a going concern through the early stages of a Phase III contract, sometimes referred to as "transitioning" into use by Army personnel.
	OTHER PEOPLE'S MONEY	Make the case that non-Army and/or non-DoD dollars will continue to fund improvements to your solution from which the Army will benefit in the future. Companies who cannot demonstrate non-Army and/or non-DoD funding sources for future solution enhancements are less attractive to the Applied SBIR program.
weight 10%	FINANCIAL PROFIT POTENTIAL	Through the Applied SBIR program, the Army wants to take advantage of the speed and scalability of dual-use companies. Make your best case that your product is or will be profitable. If you have more than one product, please focus your argument on the product / solution presented for this SBIR program.
TEAM ABILITY	*weight 10%*	Prove your team has executed well as a group. Please draw clear distinctions between private sector, DoD and civilian government work. What milestones have you accomplished as a group in this company?
SUBMISSION QUALITY	QUALITY OF PROSE	Prove you write clearly. Prove you argue convincingly.
weight 5%	DATA QUALITY & ATTRIBUTION	Support your arguments with relevant, properly attributed data to enhance your credibility.

Army SBIR 23.4 Topic Index
Release 2

A234-004 Diver Performance Monitoring System

A234-004 Diver Performance Monitoring System

OUSD (R&E) MODERNIZATION PRIORITY: Biotechnology

TECHNOLOGY AREA(S): Sensors; Electronics; Information Systems

OBJECTIVE:
Develop a solution that monitors relevant physiological markers and can alert divers of predetermined thresholds on risk. This solution includes form factor developments, accurate biomarker readings from sensors, durability for fresh, chlorinated, and salt-water environments, and on device computing to activate alerts based on predetermined thresholds.

DESCRIPTION: Despite significant safety and overwatch, fatalities of student divers occasionally occur during training, with causes unknown in some cases. It is necessary to accurately monitor student biomarkers to determine when to alert nearby instructors and safety divers as special operations diving safety is paramount. Technology enabling systems that can alert divers in multiple environments can provide another tool for the military to use to ensure safe operations in high risk, high stress environments. Desired capabilities are broken up into critical, essential, and enhancing to articulate the minimum acceptable capabilities up to fully desired capabilities for product development.

Critical (essential needs/must have):

- Accurate measurement of the following vital signs in fresh and chlorinated environments
  - Heart rate tracking
    - Within 5 beats of clinical-grade device
  - Blood or tissue oxygen saturation - SpO2/StO2 (within 2-5% of clinical-grade device)
- Bluetooth and/or WiFi capabilities for transferring recorded data
- Capable of implementing compatibility with the USSOCOM Human Performance Data Management System (HPDMS), i.e. Smartabase (API)
- 24-hour continuous runtime
- Adequate storage to capture 24 hours of critical data

Desired (strongly wanted features):

- Accurate measurement of the following vital signs in fresh, chlorinated and salad water
  - Heart rate tracking
    - Within 5 beats of clinical-grade device
  - Blood or tissue oxygen saturation - SpO2/StO2 (within 2-5% of clinical-grade device)
- Heart Rate Variability (HRV)
  - Sampling rate 500-1000Hz (can record data at a lower rate)
- Present real-time physiological data to the user on a wearable display
- Accurate measurement of water depth and ambient temperature (air or water)
- Ability to set alert thresholds (preferably by a dive instructor)
  - Instructors will edit thresholds in HPDMS
- Ability to alert the wearer
  - Instructors will have ability to toggle alert
- Ability to alert nearby divers underwater of the wearers alert condition
- Functional at depths up to 130ft
- Functional at water temperatures between 34^{O}-100^{O} F
- Accurate respiratory rate measurement in fresh, chlorinated, and saltwater environments

Enhancing (increases value to the user):

- Skin temperature measurement in fresh, chlorinated, and saltwater environments
- Core temperature measurement in fresh, chlorinated, and saltwater environments
- Ability to measure any other parameters vendors deem important
- Any other additional features vendors propose as potentially useful

Constraints:

- The device cannot interfere with training or other gear (BCD, dive computer, mask, etc.)
- The device shall minimize the use of buttons to display physiological parameters

PHASE I:
Design a proof-of-concept solution for a device capable of accurately monitoring physiological markers vendors conclude are necessary (e.g. heart rate, SpO2, etc.) which can alert divers and instructors on predetermined thresholds of risk. The design should include, but not limited to, accurate measurements of heart rate and SpO2 or StO2 (in dry, fresh, and chlorinated environments), Bluetooth and/or WiFi capabilities, battery life and memory for a 24-hour continuous runtime, and should be capable of interfacing with the Human Performance Data Management System (HPDMS), i.e. Smartabase (API). The device can be standalone or integrated with standard dive equipment. Other features, capabilities, and/or solutions not addressed in this solicitation that vendors determine will be beneficial to improving safety of Army divers are encouraged.

Phase I will award $150,000 over a 3-month period of performance (PoP). The 3 month period will include several virtual sessions with TPOCs and an option to travel to San Diego to assist with refinement of a final presentation on month 3. The final presentation will take into account adjustments to approach, desire to work with other vendors to solve the proposed problem, and cost effectiveness of the solution.
Proposals will be evaluated on a holistic basis based on their relevance, total cost, developmental timeline, ability to integrate into a system of systems, modularity, compatibility with open architecture, and any additional features the proposer includes.

Companies can voluntarily participate in the Army Applications Laboratory (AAL) 12-week cohort program. The AAL cohort program is designed to solve specific Army modernization challenges on a compressed timeline. The cohort program matches qualified companies with Army problems owners to speed capability development, accelerate transition, and de-risk or inform requirements. This program is designed for businesses that own unique, applicable technology and are interested in growing a new line of business into the DoD.

The cohort program will enhance technology development through the rapid exposure to Army stakeholders and the sustainment, maneuver, and robotics acquisition communities. Planned activities include a problem topic deep dive, a field week with Army sustainment and maneuver leaders and soldiers, hands-on experience with currently fielded military equipment and weapon systems, and stakeholder engagement from the requirements writer to acquisition manager to the end-user. An example cohort program for this topic is:
Week 1 – Orientation and problem deep dive (virtual)
Week 2 – Soldier Touchpoint (in-person at a military installation)
Week 3-6 – Concept research and planning
Week 7 – Mid-point concept design brief to stakeholders and SME roundtable discussion (virtual)
Week 8-11 – Concept design refinement
Week 12 – Final concept design brief to Army Senior Leaders (virtual)

Cohort programming will be provided free of charge. Proposers that plan to participate in the cohort (if awarded a Phase I) are encouraged to include travel costs for one cohort trip, within the continental US, of

4-5 days each for in-person programming. In-person events may be substituted for virtual events depending on COVID-19 travel restrictions. Details will be provided to awardees under this topic at Phase I award.

PHASE II:
Demonstrate a prototype device capable of monitoring physiological markers, established in Phase I, which can alert divers on predetermined thresholds of risk. Vendors will have quarterly touchpoints with military stakeholders and develop said prototype to conform to listed parameters throughout the 21-month PoP. Soldier touchpoints will be provided free of charge. Proposers that plan to participate in the Soldier touchpoints (if awarded a Phase II) are encouraged to include travel costs for 7 touchpoints, within the continental US, of 1-2 days each for in-person events. It is incumbent on the vendor to provide proposed, iterative deliverables over the PoP (or sooner) to complete the identified solution. Vendors will interact with military diving experts prior to delivering physical solutions to combat divers. Potential solutions can iterate and the ability to test potential solutions with a military unit is available free of charge. Solutions will be evaluated in priority of critical, essential, and enhancing priorities. Access to military diving experts during the touchpoints for feedback is free of charge, and companies should include the estimated cost of travel (assume quarterly multi day trips to various dive training locations such as San Diego, Key West, Panama City, or Pensacola for set-up, iterative prototyping, final product delivery & testing) to these touchpoints in their budget.

In addition to the Phase II deliverable of a prototype for extended Soldier touch points, companies will provide deliverable and final reports detailing performance and associated deliverables, any iterative adjustments based on user feedback, and final product details. The final report should also include plans to adopt the solution onto a military network with associated security protocols and logical access points.

PHASE III:
The objective of Phase III, where appropriate, is for the small business to pursue commercialization objectives through the effort by improving the device and developing the technology to TRL 7 and document the final design. Companies will iterate on and deliver final prototypes, make modifications to adapt to the required COTS wearables as identified through extended Soldier touch points and create a viable prototype for combat divers in various underwater scenarios. Prototypes shall be in their final form factor, capable of being worn and used by divers, and may be subjected to environmental testing at the government's discretion.

Phase III deliverables include integration with USSOCOM Human Performance Data Management System (HPDMS), i.e. Smartabase (API), user documentation, and prototype(s) for demonstration and government-sponsored testing.

WEBINAR DATE:
Tuesday December 13, 2022 10:00 am CT
To learn more about this topic, and ask questions of Army stakeholders involved in the project register for a webinar: https://diver-performance.eventbrite.com
The Link to the video recording of the webinar will be posted in the DSIP portal in the days following.

KEYWORDS: Human performance optimization, HPO, underwater sensors, under water, underwater, sensor, HP, high risk, high stress, combat diver, heart rate, SpO2, StO2

REFERENCES

1. Optimizing sampling rate of wrist-worn optical sensors for physiologic monitoring | Journal of Clinical and Translational Science | Cambridge Core
2. Wearable Pulse Oximeter for Swimming Pool Safety - PMC (nih.gov)

3. Frontiers | Using Underwater Pulse Oximetry in Freediving to Extreme Depths to Study Risk of Hypoxic Blackout and Diving Response Phases (frontiersin.org)
4. The Dewey Monitor: Pulse Oximetry can Warn of Hypoxia in an Immersed Rebreather Diver in Multiple Scenarios | SpringerLink
5. AAL | Resource Center
6. http://aal.army/assets/files/pdf/sbir-phase-1-template.pdf
7. http://aal.army/assets/files/pdf/sbir-optional-slide-template.pdf

TPOCs:

- Dr. Ann Kathryn Rockwell
- MAJ Allison Brager
- MAJ Paul Tate
- Dr. John Clark
- Dr. Alex Garbino
- John Houfek
- Scott Swetz

Use the following link to schedule a TPOC call (available December 06, 2022 – January 9, 2023): https://calendly.com/ak-rockwell-aal/dpms